Arthropoda Selecta 31(2): 157–165 © ARTHROPODA SELECTA, 2022

New records of millipedes (Diplopoda) from the Caucasus region

Новые находки двупарноногих многоножек (Diplopoda) из кавказского региона

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KEY WORDS: taxonomy, iconography, Russia, Abkhazia, Armenia, fauna, distribution.

КЛЮЧЕВЫЕ СЛОВА: таксономия, иконография, Россия, Абхазия, Армения, фауна, распространение.

ABSTRACT. New faunistic records are provided for 38 millipede species, representing nine families and six orders from the Caucasus, including the Krasnodar and Stavropol provinces, Adygea, Karachaevo-Cherkessia, Abkhazia, Georgia, Armenia, and Ciscaucasia (Rostov-on-Don Region). A new iconography is presented for 14 species. Records of several recently described species are of particular interest, because they considerably extend our knowledge of their actual distribution areas.

How to cite this paper: Evsyukov A.P., Golovatch S.I., Vagalinski B., Chumachenko Yu.A., Turbanov I.S., Zabiyaka I.Yu. 2022. New records of millipedes (Diplopoda) from the Caucasus region // Arthropoda Selecta. Vol.31. No.2. P.157–165. doi: 10.15298/arthsel. 31.2.03

РЕЗЮМЕ. Представлены новые фаунистические находки для 38 видов двупарноногих многоножек из 9 семейств и 6 отрядов с Кавказа, включая Краснодарский и Ставропольский край, Адыгею, Карачаево-Черкесию, Абхазию, Грузию и Армению, и Предкавказья (Ростовская область). Дана новая иконография для 14 видов. Особенно интересны находки недавно описанных видов, расширяющие представления об их ареалах.

Introduction

Studies on the diplopod fauna of the Caucasus have recently experienced significant progress. Many millipede groups have been revised based on abundant material, both old and new [Vagalinski, Golovatch, 2021;

Evsyukov *et al*., 2020, 2021; Short *et al*., 2020, etc.]. However, the distributions of numerous species remain far from thoroughly revealed. In addition to papers devoted to the diplopod faunas of separate regions or countries in the Caucasus [Evsyukov, Golovatch, 2013; Zuev, 2014, 2021; Kokhia, Golovatch, 2020; Korobushkin *et al*., 2013], there are contributions to individual taxa [Golovatch, Chumachenko, 2013; Golovatch *et al*., 2021; Golovatch, 2021]. The present paper puts on record another considerable number of millipedes in Ciscaucasia and the Caucasus.

Material and methods

The material has been shared between the collections of the Zoological Museum of the Moscow University (ZMUM), the Zoological Institute of the Russian Academy of Sciences, Saint-Petersburg (ZIN), the Don State Technical University, Rostov-on-Don (DSTU), the National Museum of Natural History, Sofia, Bulgaria (NMNHS), the Senckenberg Museum für Naturkunde Görlitz (SMNG), and the private collection of I. Turbanov (IT), as indicated below. The samples are stored in 95% ethanol. SEM micrographs were taken using a Zeiss CrossBeam 340 (DSTU) scanning electron microscope. After examination, SEM material was removed from stubs and returned to alcohol. Photographs were taken using a Zeiss StereoDiscovery V.20 microscope. All images were processed using Adobe Photoshop 2020 software.

Taxonomic part

ORDER POLYXENIDA
Family Lophoproctidae
Lophoproctus coecus Pocock, 1894

MATERIAL. 1 ex. (DSTU), Russia, Rostov-on-Don Region, near Stoyanov, valley of Tuzlov River, under stones, 47.4727ºN, 39.4706ºE, 5.XI.2021, A.P. Evsyukov leg.

REMARKS. Because the single lophoproctid species presently known to occur in the entire Caucasus region and Crimea has recently been shown to be *Lophoproctus coecus* (see Short [2015]; Short *et al*. [2020]), the above identification is only circumstantial, being based on the geographic proximity alone. The more so as the same species had previously been recorded from the Rostov-on-Don Region and misidentified as *L. lucidus* (Chalande, 1888) [Evsyukov, Golovatch, 2013].

Family Polyxenidae
?Polyxenus lagurus (Linnaeus, 1758)

MATERIAL. 1 ex. (DSTU), Russia, Krasnodar Prov., near Armavir, bank of Urup River, deciduous forest, under logs, 44º56′42.2″N, 41º09′04.8″E, 7.V.2021, A.P. Evsyukov leg.

REMARKS. Unlike the eyeless Lophoproctidae, the eyed Polyxenidae are known to be represented in the Caucasus by as many as three species: *Polyxenus lagurus* (Linnaeus, 1758), P. *lankaranensis* Short, Vahtera, Wesener et Golovatch, 2020, and *Propolyxenus argentifer* (Verhoeff, 1921) [Short *et al*., 2020]. The most widespread is the latter species: pan-Caucasian, including most of Hyrcania in Iran, also reported from Crimea. The identity of the above sample from the Krasnodar Province is thus bound to remain but provisional, supplied with a question mark.

ORDER GLOMERIDA
Family Glomeridae
Hyleoglomeris awchasica (Brandt, 1840)

MATERIAL. 1 ♂, 1 ♀ (DSTU), Abkhazia, Tkvarchel Distr., near Akarmara, mixed forest, litter, 42.8605ºN, 41.7662ºE, 23.III. 2021, leg. I.S. Turbanov; 4 ♀♀ (DSTU), Russia, Adygea, Caucasian Nature Reserve, Lagonaki Plateau, mixed *Betula* & *Picea* forest, 44º03′39.2″N, 40º01′03.0″E, 5.V.2021, A.P. Evsyukov leg.

REMARK. A widespread western Caucasian species recorder from Georgia, Abkhazia and Russia within Adygea, and the Krasnodar and Stavropol provinces [Golovatch, 1989, 2021; Golovatch *et al*., 2006; Korobushkin *et al*., 2013].

Hyleoglomeris specialis Golovatch, 1990

MATERIAL. 1 juv. (ZMUM), Dagestan Republic, Buynaksk Distr., Erpeli, 42.79858ºN, 47.014616ºE, broadleaved forest, litter, Berlese extraction, 17.X.2021; 36 juv. (ZMUM), Russia, Chechen Republic, Kurchaloy Distr., near Niki-Khita, 43.104215ºN, 46. 079969ºE, broadleaved forest, litter, hand-sorting, 18.X.2021, all K.B. Gongalsky leg.

REMARKS. A widespread Caucasian endemic species ranging from Chechnya, Russia in the north to central and eastern Georgia in the south [Golovatch, 1989]. One of the above records is new to the fauna of Dagestan.

Trachysphaera solida Golovatch, 1976

MATERIAL. 1 ♀ (SMNG), Georgia, Imereti, Kutaisi, Tskaltubo, Kumistavi, Tskaltubo Cave, on dead wood and droppings, 42.3773ºN, 42.6005ºE, 11.VI.2019, H. Reip leg.

REMARK. This species is endemic to the western Caucasus within both western Georgia and Abkhazia, first synonymized with *T. anatolica* Ceuca, 1975, but revalidated soon after that [Golovatch, 1990a, 1994]. The above sample is a near-topotype.

Trachysphaera costata (Waga, 1857)

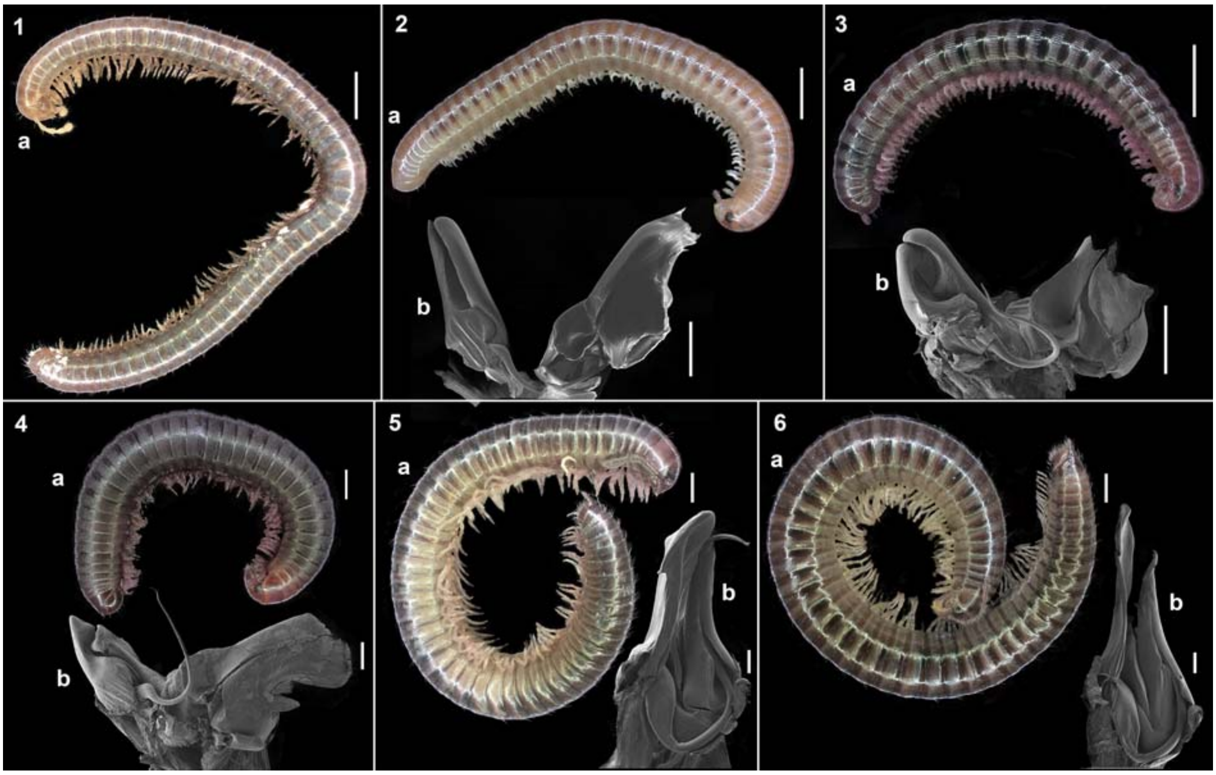
MATERIAL. 1 ♂, 6 ♀♀ (DSTU), Russia, Adygea, Caucasian Nature Reserve, Lagonaki Plateau, mixed *Betula* & *Picea* forest, 44º03′39.2″N, 40º01′03.0″E, 5.V.2021, A.P. Evsyukov leg.; 1 ♂, 1 ♀ (ZMUM), Dagestan Republic, Buynaksk Distr., Erpeli, 42.79858ºN, 47.014616ºE, broadleaved forest, litter, Berlese extraction, 17.X.2021, K.B. Gongalsky leg.

REMARKS. A widespread Eastern European to Eastern Mediterranean species ranging from Central Europe and the Balkan Peninsula in the west, through Ukraine, Crimea, and the Near East, to the entire Caucasus region, including much of Hyrcania in Iran in the east [Golovatch, 1990a, b, 2008; Antić *et al*., 2021]. In the Caucasus, previously recorded as *T. rotundata* (Lignau, 1911), a junior synonym of *T. costata* (see Golovatch [2008]), from Armenia, Georgia, Abkhazia and Russia (Adygea, Krasnodar and Stavropol Provinces, Kabardino-Balkaria, Chechnya and Ingushetia) [Golovatch, 1990a, 2010, 2021; Korobushkin *et al*., 2013; Zuev, 2014, 2021; Golovatch *et al*., 2021]. One of the above records in new to the fauna of Dagestan.

Trachysphaera fragilis Golovatch, 1976

MATERIAL. 2 ♂♂, 2 ♀♀, 1 juv. (SMNG), Georgia, Imereti, Kutaisi, Tskaltubo, Kumistavi, Tskaltubo Cave, on dead wood and droppings, 42.3773ºN, 42.6005ºE, 11.VI.2019, H. Reip leg.; many ♂♂, ♀♀ and juv. (SMNG), same region, Kutaisi, Sataplia reserve, Sataplia Cave, near the entrance, on dead wood, 42.312ºN, 42.6754ºE, 6.VI.2019, H. Reip leg.

REMARK. This species is apparently a narrow endemic to the limestone area around Kutaisi, and is probably a troglobiont [Golovatch, 1976, 1990a].



Figs 1–6. Habitus (**a**) and gonopods (**b**) of some millipedes from the Caucasus region: 1 — *Amblyiulus hirtus* Evsyukov, Golovatch et Antić, 2021; 2 — *Cylindroiulus placidus* (Lignau, 1903); 3 — *Cylindroiulus pterophylacum* Read, 1992; 4 — *Cylindroiulus ruber* (Lignau, 1903); 5 — *Julus colchicus* Lohmander, 1936; 6 — *Julus lignaui* Verhoeff, 1910. Scale bars: 1 mm (**a**); 0.1 mm (**b**).

Рис. 1–6. Габитус (**a**) и гоноподы (**b**) некоторых двупарноногих многоножек из Кавказского региона: 1 — *Amblyiulus hirtus* Evsyukov, Golovatch et Antić, 2021; 2 — *Cylindroiulus placidus* (Lignau, 1903); 3 — *Cylindroiulus pterophylacum* Read, 1992; 4 — *Cylindroiulus ruber* (Lignau, 1903); 5 — *Julus colchicus* Lohmander, 1936; 6 — *Julus lignaui* Verhoeff, 1910. Масштаб: 1 мм (**a**); 0,1 мм (**b**).

Trachysphaera orientalis Golovatch, 1976

MATERIAL. 1 ♂ (SMNG), Georgia, Imereti, Chiatura, between Rgani and Vachevi, Kokozouri Cave, on wood remains, 43.3169ºN, 43.2203ºE, 15.VI.2019, H. Reip leg.

REMARK. The present record concerns near-topotypes and it fails to add much information on the distribution of this species, which seems to be very limited and confined to western Georgia [Golovatch, 1990a].

ORDER POLYZONIIDA

Family Hirudisomatidae

Hirudisoma roseum (Victor, 1839)

MATERIAL. 1 juv. (IT), Russia, Krasnodar Prov., Apsheronsky Distr., NE spurs of Logonaki Plateau, Azish-Tau Mt. Range, Piketnaya Cave, 16.XI.2020, leg. I.S. Turbanov.

REMARKS. Subendemic to the Caucasus: Russia, Abkhazia, Georgia, Azerbaijan and N Turkey. Also recorded from near the entrances to the Sataplia I Cave (Georgia) and Skubi-Nykhasskaya Cave (N Ossetia, Russia) [Golovatch *et al*., 2015, 2021]. Apparently, a trogloxene.

ORDER JULIDA

Family Blaniulidae

Cibiniulus phlepsii (Verhoeff, 1897)

MATERIAL. 1 ♂ (DSTU), Abkhazia, Tkvarchel Distr., near Akarmara, mixed forest, litter, 42.8605ºN, 41.7662ºE, 23.III.2021, I.S. Turbanov leg.

REMARKS. In the Caucasus, this widespread Eastern European to Eastern Mediterranean species is known to occur in Abkhazia and Ajaria, Georgia [Enghoff, 1984; Kime, Enghoff, 2017]. At least partly, probably anthropochoric [Talikadze, 1982].

Nopoiulus kochii (Gervais, 1847)

MATERIAL. Numerous ♂♂, ♀♀ and juv. (ZMUM), Russia, Krasnodar Prov., Greater Sochi, Khosta, Cave Partizanskaya, pitfall traps, 30.IV–24.VIII.1992, A.G. Koval leg.

REMARKS. This subcosmopolitan species is widespread across the entire Caucasus region, being encountered in various habitats, both man-made and natural [Golovatch, Enghoff, 1990]. It has already been recorded from two other caves near Sochi, Caucasus [Turbanov *et al*., 2016].

Family Julidae

Amblyiulus hirtus Evsyukov, Golovatch et Antić, 2021

Fig. 1.

MATERIAL. 3 ♀♀ (ZMUM), Russia, Dagestan, near Primorsky, Samur Forest, 41.86ºN, 48.56ºE, 3–8.IV.2021, leg. O. Makarova; 1 ♀ (ZMUM), Dagestan, Buinaksk Distr., Chirkeiskoe Reservoir, under stones, 400 m a.s.l., 7.VI.2021, R.V. Zuev & E.M. Bondarenko leg.

REMARK. Eastern Caucasian endemic. Known only from northern Azerbaijan and Dagestan, Russia [Evsyukov *et al*., 2021].

Cylindroiulus bicolor Lohmander, 1932

MATERIAL. 3 ♂♂, 10 ♀♀, 6 juv. (SMNG), Armenia, Syunik, Verin Vachagan, NE slope of Mount Khustup, forest, moss on wet rock, 1300 m a.s.l., 39.1700ºN, 46.3672ºE, 21.VIII.2018, F. Walther leg.; 1 ♂, 4 ♀♀ (SMNG), same province, Verin Khotanan, 2.7 rkm towards Tatev, damp place at forest edge, 1820 a.s.l., 39.3239ºN, 46.3691ºE, 23.VIII.2018, F. Walther leg.

REMARK. The specimens from Verin Kothanan may belong to another, closely related species, based on the structure of the posterior gonopods which show a higher and more strongly tapering phylacum devoid of fringes.

Cylindroiulus kacheticus Lohmander, 1936

MATERIAL. 1 ♂, 2 ♀♀ (SMNG), Georgia, Lagodekhi N, Lagodekhi Nature Reserve, Lagodekhiskhevi River, mixed forest, 1.VII.2013, L. Mumladze leg.; 1 ♀ (ZMUM), Dagestan Republic, Buynaksk Distr., Erpeli, 42.79858ºN, 47.014616ºE, broadleaved forest, litter, Berlese extraction, 17.X.2021; 2 ♂, 3 ♀♀, 14 juv. (ZMUM), Russia, Chechen Republic, Kurchaloy Distr., near Niki-Khita, 43.104215ºN, 46.079969ºE, broadleaved forest, litter, hand-sorting, 18.X.2021; 2 ♀♀ (ZMUM), Chechen Republic, Shali Distr., Anishty, 43.104215ºN, 46.079969ºE, *Fagus* forest, 18.X.2021, all D.I. Korobushkin & K.B. Gongalsky leg.

REMARK. This species is widespread in the eastern half of the Caucasus Major: Russia (Chechnya), eastern Georgia, and northern Azerbaijan Republic [Read, 1992]. It is thus new to the fauna of Dagestan.

Cylindroiulus placidus (Lignau, 1903)
Fig. 2.

MATERIAL. 1 ♂, 2 ♀♀ (DSTU), Abkhazia, Tkvarchel Distr., near Akarmara, mixed forest, litter, 42.8605ºN, 41.7662ºE, 23.III.2021, I.S. Turbanov leg.

REMARKS. Endemic to the western Caucasus, widespread, ranging from Krasnodar Province in the north to Abkhazia and southern Georgia in the south, and from the Black Sea coast in the west to North Ossetia – Alania in the east [Lohmander, 1936; Read, 1992; Chumachenko, 2016; Golovatch, Antipova, 2022].

Cylindroiulus cf. *placidus* [sensu Read (1992)]

MATERIAL. 1 ♂, 5 ♀♀, 6 juv. (SMNG), Georgia, Mingrelia-Alta Svanezia, Mestia, Tal Ri Glacier, various deciduous bushes, *Abies nordmanni*, *Picea orientalis* etc., in litter, 43.1147ºN, 42.7469ºE, 6.IX.2019, H. Reip leg.

REMARK. The examined specimens show the same differences from the typical *C. placidus*, as those listed by Read [1992]. They most likely represent an undescribed, closely related species, distributed at higher altitudes in northwestern Georgia.

Cylindroiulus pterophylacum Read, 1992
Fig. 3.

MATERIAL. 1 ♂, 4 ♀♀, 1 juv. (SMNG), Russia, Adygea, Mt. Koryto, open *Abies* forests with dense undergrowth of herbs and shrubs 1600 m a.s.l., 44°03′53″N, 40°21′02″E, 22.VIII.2005, K. Voigtländer leg.; 2 ♂♂, 2 ♀♀ (DSTU), Russia, Adygea, near Dakhovskaya, mixed forest with *Abies*, under logs, 44º08′32.7″N, 40º03′00.3″E, 5.V.2021, leg. A.P. Evsyukov; 1 ♂, 3 ♀♀, 3 juv. (DSTU), Russia, Krasnodar Prov., slope of Aishkha Mountain Ridge, Mzymta River valley, *Fagus* forest, 1250 m a.s.l., 43º37.055′N, 40º27.503′E, 16.IX.2021, leg. Y.A. Chumachenko.

REMARK. Endemic to the western Caucasus: widespread, ranging from the Krasnodar Province to northern Georgia [Read, 1992; Zuev, 2014, 2021; Chumachenko, 2016; Golovatch, 2021].

Cylindroiulus quadrus Read, 1992

MATERIAL. 1 ♂ (SMNG), Georgia, Samegrelo-Zemo Svaneti, near Ambrolauri, at Shareula River, forest, litter, 42.5175ºN, 42.9165ºE, H. Reip leg., 14.VI.2019, H. Reip leg.

REMARK. The present record lies considerably west of the previously known range of this species.

Cylindroiulus ruber (Lignau, 1903)
Fig. 4.

MATERIAL. 1 ♂, 5 ♀♀, 1 juv. (DSTU), Russia, Krasnodar Prov., slope of Aishkha Mountain Ridge, Mzymta River valley, *Fagus* forest, 1250 m a.s.l., 43º37.055′N, 40º27.503′E, 16.IX.2021, Y. Chumachenko leg.

REMARKS. Endemic to the western Caucasus: the Krasnodar and Stavropol provinces, as well as the republics of Kabardino-Balkaria, Russia and Abkhazia [Lohmander, 1936; Read, 1992; Golovatch, 2021].

Cylindroiulus schestoperovi Lohmander, 1932

MATERIAL. 1 ♂ (SMNG), Georgia, Racha-Lechkhumi and Kvemo Svaneti, Racha Mountains, forest on SW slope of Mt. Khikhata, 2070 m a.s.l., 42.47389ºN, 43.35917ºE, 15.VIII.2014, F. Walther leg.

REMARK. A common species in western Georgia [Read, 1992; Kokhia, Golovatch, 2018].

Julus colchicus Lohmander, 1936
Fig. 5.

MATERIAL. 1 ♂, 5 ♀♀ (DSTU), Russia, Krasnodar Prov., near Armavir, bank of Urup River, deciduous forest, under logs, 44º56′42.2″N, 41º09′04.8″E, 7.V.2021, A.P. Evsyukov leg.; 2 ♂♂, 3 ♀♀, 2 juv. (DSTU), Russia, Krasnodar Prov., slope of Aishkha Mountain Ridge, Mzymta River valley, *Fagus* forest, 1250 m a.s.l., 43º37.055′N, 40º27.503′E, 16.IX.2021, Y.A. Chumachenko leg.

REMARKS. Subendemic to the Caucasus region, previously recorded from the Krasnodar and Stavropol provinces, Adygea, Karachaevo-Cherkessia, Abkhazia, Georgia and adjacent parts of Turkey [Lohmander, 1936; Kobakhidze, 1965; Golovatch, 1977; Talikadze, 1984; Enghoff, 2006; Chumachenko, 2016; Korobushkin *et al*., 2016; Evsyukov *et al*., 2018; Zuev, 2021].

Julus lignaui Verhoeff, 1910
Fig. 6.

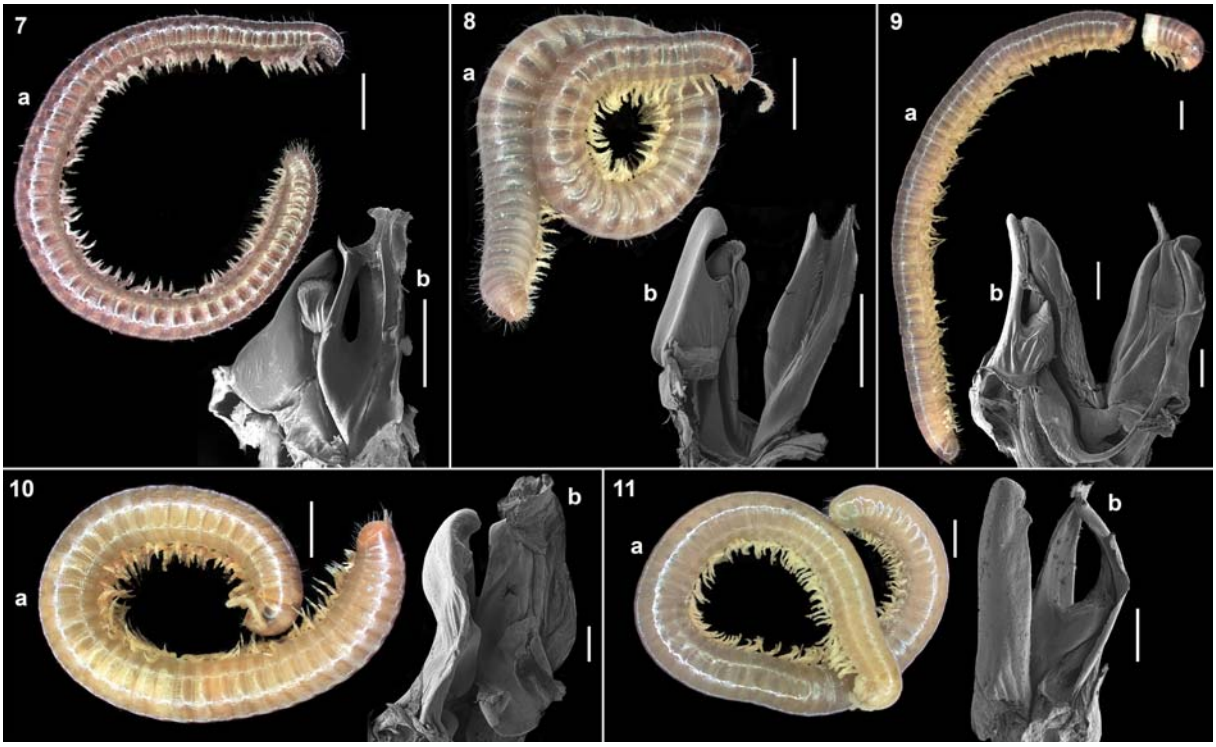
MATERIAL. 2 ♂♂, 2 ♀♀ (DSTU), Russia, Kabardino-Balkaria, Verkhnyaya Balkaria, valley of Cherek Balkarskyi River, dry slope, under stones, 1200 m a.s.l., 43.1059ºN, 43.4306ºE, 23.IX.2021, A.P. Evsyukov leg.

REMARKS. A Colchidan species endemic to the western Caucasus, probably high-montane. Previously recorded only from the Krasnodar Province and Abkhazia [Lignau, 1903; Verhoeff, 1910; Kobakhidze, 1965; Talikadze, 1984; Evsyukov *et al*., 2018]. The above new record is new to the Republic of Kabardino-Balkaria, apparently representing the species' northeasternmost locality.

Kubaniulus gracilis Lohmander, 1936
Fig. 7.

MATERIAL. 5 ♂♂, 4 ♀♀ (DSTU), 2 ♂♂, 2 ♀♀ (NMNHS), Russia, Krasnodar Prov., Caucasian Nature Reserve, valley of Umpyr River, *Betula* & *Pinus* forest, 2050 m a.s.l., 43º45.277′N, 40º 43.497′E, 1.VII.2021, Y.A. Chumachenko leg.

REMARKS. A Colchidan species endemic to the western Caucasus within the Krasnodar Province and Adygea [Lohmander, 1936; Evsyukov *et al*., 2020].



Figs 7–11. Habitus (**a**) and gonopods (**b**) of some millipedes from the Caucasus region: 7 — *Kubaniulus gracilis* Lohmander, 1936; 8 — *K. lativelatus* Evsyukov, Golovatch, Reip et VandenSpiegel, 2020; 9 — *Leptoiulus hastatus* Lohmander, 1932; 10 — *Omobrachyiulus fasciatus* Vagalinski, 2021; 11 — *Syrioiulus armeniacus* Evsyukov, Golovatch et Antić, 2021. Scale bars: 1 mm (**a**); 0.1 mm (**b**).

Рис. 7–11. Габитус (**a**) и гоноподы (**b**) некоторых двупарноногих многоножек из Кавказского региона: 7 — *Kubaniulus gracilis* Lohmander, 1936; 8 — *K. lativelatus* Evsyukov, Golovatch, Reip et VandenSpiegel, 2020; 9 — *Leptoiulus hastatus* Lohmander, 1932; 10 — *Omobrachyiulus fasciatus* Vagalinski, 2021; 11 — *Syrioiulus armeniacus* Evsyukov, Golovatch et Antić, 2021. Масштаб: 1 мм (**a**); 0,1 мм (**b**).

Kubaniulus lativelatus Evsyukov, Golovatch, Reip et VandenSpiegel, 2020
Fig. 8.

MATERIAL. 1 ♂ (DSTU), Russia, Stavropol, Botanical Garden, 16.VI.2012; 1 ♀ (DSTU), same locality, 26.IV.2014, 1 ♂, 1 ♀ (DSTU), 2 ♂♂, 5 ♀♀ (NMNHS), Stavropol Prov., Stavropol, Tamansky Forest, broadleaf forest, 4.IV.2021; 1 ♀ (DSTU), Adygea, near Guzeripl, mixed forest, 4.VII.2015, all R.V. Zuev leg.; 2 ♂♂, 3 ♀♀ (NMNHS), Krasnodar Prov., Caucasian Nature Reserve, Khosta, 27.IV.2021, Y.A. Chumachenko leg.

REMARKS. Endemic to the western, Colchidan part of the Caucasus, recorded from the Krasnodar Province, Karachaevo-Cherkessia, Abkhazia, and Georgia [Evsyukov *et al*., 2020]. Zuev's [2014, 2021] recent records of *Chaetoleptophyllum flexum* Golovatch, 1979 and *K. gracilis* from the Stavropol Province are misidentifications, actually to be referred to *K. lativelatus* [Evsyukov *et al*., 2020].

Leptoiulus hastatus Lohmander, 1932
Fig. 9.

MATERIAL. 3 ♀♀ (ZMUM), Armenia, Lake Sevan, near Sevan Town, forest stripe, under stones, 15.VIII.1985, leg. ?; 1 ♂ (ZMUM), Azerbaijan, Turianchay Nature Reserve, xerophytic *Quercus* & *Pistacia* forest, litter, 2–4.X.1994, S. Dashdamirov leg.; 2 ♂♂, 2 ♀♀ (SMNG), Armenia, Syunik, Gorayk towards Tsghuk, old cemetery above Spandarian Reservoir, 2080 m a.s.l., 39.6737ºN, 45.8061ºE, 20.VIII.2018, F. Walther leg.; 1 ♂, 3 ♀♀ (SMNG), Armenia, Tavush, Semyonovka, 1 rkm towards Dilijan, 2080 m a.s.l., 40.6664ºN, 44.8868ºE, 16.VIII.2018, F. Walther leg.

REMARK. This pan-Caucasian species has previously been recorded from northwestern Iran, Armenia, Azerbaijan and Georgia [Lohmander, 1932; Evsyukov *et al*., 2020].

Leptoiulus tanymorphus (Attems, 1901)

MATERIAL. 1 ♂ (ZMUM), Azerbaijan, Turianchay Nature Reserve, xerophytic *Quercus* & *Pistacia* forest, litter, 2–4.X.1994, S. Dashdamirov leg.

REMARK. This species is likewise very common and widespread, yet being confined to the eastern half of the Caucasus region: northwestern Iran, Armenia, Azerbaijan, Russia (Dagestan), and both central and eastern Georgia [Lohmander, 1932; Evsyukov *et al*., 2020].

Omobrachyiulus caucasicus (Karsch, 1881)

MATERIAL. 2 ♀♀ (ZMUM), Azerbaijan, Turianchay Nature Reserve, xerophytic *Quercus* & *Pistacia* woodland, litter, 2–4.X.1994, S. Dashdamirov leg.; 1 ♂, 1 juv. (ZMUM), Dagestan Republic, Agul Distr., Chirag, 41.817649ºN, 47.436119ºE, Chiragchay River bank, *Alnus* forest, 15.X.2021; 1 ♂ (ZMUM), Dagestan Republic, Khiv Distr., Trkal, 41.716422ºN, 47.9700ºE, apple orchard, 16.X.2021; 10 ♂♂, 4 ♀♀, 6 juv. (ZMUM), Russia, Dagestan Republic, Buynaksk Distr., Erpeli, 42.79858ºN, 47.014616ºE, broadleaved forest, litter, Berlese extraction, 17.X.2021; 3 ♀♀, 1 juv. (ZMUM), Chechen Republic, Shali Distr., Anishty, 43.104215ºN, 46.079969ºE, *Fagus* forest, 18.X.2021; 3 juv. (ZMUM), Chechen Republic, Vedeno Distr., Tevzana, 42.485637ºN, 45.896675ºE, bank of Terek River, *Alnus* forest, 18.X.2021; 1 ♂, 5 ♀♀, 2 juv. (ZMUM), Chechen Republic, Kurchaloy Distr., near Niki-Khita, 43.104215ºN, 46. 079969ºE, broadleaved forest, litter, handsorting, 18.X.2021, all D.I. Korobushkin & K.B. Gongalsky leg.

REMARKS. Subendemic to the Caucasus region, very common and highly widespread across Ciscaucasia (Stavropol in the north and up to Kalmykia in the northeast), entire Dagestan, as well as most of Georgia (except for the Black Sea coast), Armenia and Azerbaijan (including the Hyrcanian part), also in northern and northwestern Iran, and northeastern Turkey [Vagalinski, Golovatch, 2021]. A separate formal subspecies is known from the Greek island of Thassos, but its subspecific status requires confirmation [Vagalinski, Golovatch, 2021].

Omobrachyiulus fasciatus Vagalinski, 2021
Fig. 10.

MATERIAL. 4 ♂♂, 13 ♀♀ (DSTU), Russia, Krasnodar Prov., Caucasian Nature Reserve, valley of Khodzhibi River, *Abies* & *Betula* forest, 2050 m a.s.l., 43º49.388′N, 40º31.138′E, 30.IX.2021, Y.A. Chumachenko leg.

REMARKS. Described from Adygea and the Krasnodar Province, both Russia. Endemic to the northwestern parts of the Caucasus Major [Vagalinski, Golovatch, 2021].

Omobrachyiulus implicitus (Lohmander, 1936)

MATERIAL. 1 ♂ (IT), Russia, Krasnodar Prov., Apsheronskyi Distr., NE spurs of Lagonaki Plateau, Azish-Tau Mt. Range, Piketnaya Cave, 16.XI.2020, I.S. Turbanov leg.

REMARKS. Endemic of the western Caucasus [Vagalinski, Golovatch, 2021]. Above is the first record of this species from a cave, apparently a trogloxene.

Omobrachyiulus macrourus (Lohmander, 1928)

MATERIAL. 2 ♀♀ (ZMUM), Russia, Dagestan Republic, Buynaksk Distr., Erpeli, 42,79858ºN, 47.014616ºE, broadleaved forest, litter, Berlese extraction, 17.X.2021, K.B. Gongalsky leg.

REMARKS. This Caucasian endemic species has been found in Abkhazia, Russia (Kabardino-Balkaria and Chechnya) and most of Georgia [Vagalinski, Golovatch, 2021].

Pachyiulus krivolutskyi Golovatch, 1977

MATERIAL. 1 ♂, 2 juv. (IT), Russia, Krasnodar Prov., Greater Sochi, Mount Bolshoy Akhun, Akhunskaya Cave, 22.V.2016, I.S. Turbanov leg.

REMARKS. Endemic to the western, Colchidan part of the Caucasus within Russia, Abkhazia and Georgia [Evsyukov, 2016]. It has been recorded from the Ushchelnaya (= Pionerskaya) Cave near Sochi, and a nameless grotto near Novorossiysk, Krasnodar Prov., Russia [Golovatch, 1984/85], as well as Abkhazian caves: Samshitovaya, Uatapachy (= Kolodets nad Golovoy Otapa) and Marshania [Golovatch *et al*., 2021].

Rossiulus kessleri (Lohmander, 1927)

MATERIAL. 6 ♀♀ (DSTU), Russia, Rostov-on-Don Region, Neklinovka Distr., Pyatikhatki, bank of pond, *Phragmites* thicket, under stones, 47º18′24.9″N, 39º12′38.6″E, 23.V.2021, A.P. Evsyukov leg.

REMARKS. Subendemic to the East European, or Russian Plain [Lokšina, 1969; Chornyi, Golovatch, 1993; Golovatch, 1984], in the south up to the subalpine meadows of North Ossetia – Alania, northern macro slope of the central Caucasus Major [Golovatch, Antipova, 2022]. Very common in the Rostov-on-Don Region [Evsyukov, Golovatch, 2013].

Syrioiulus armeniacus Evsyukov, Golovatch et Antić, 2021
Fig. 11.

MATERIAL. 1 ♂, 4 ♀♀ (ZIN), Armenia, Erevan, Nork, dry slopes, 16.III.1936, A. Richter leg.

REMARKS. Endemic to the Caucasus Minor within Armenia [Evsyukov *et al*., 2021]. The above record is apparently the species' westernmost locality.

ORDER POLYDESMIDA

Family Polydesmidae

Brachydesmus furcatus Lohmander, 1936

MATERIAL. 1 ♂, 1 ♀ (IT), Russia, Krasnodar Prov., Goryachiy Klyuch, near Fanagoriyskoe, Fanagoriyskaya Cave, 1.12.2018, P.V. Somchenko leg.

REMARKS. Endemic to the western Caucasus: Russia and Abkhazia [Golovatch *et al*., 2016], also encountered as a troglophile in several caves: Piketnaya, Akhunskaya, Fanagoriyskaya, Medvezhya and Baribana, all within the Krasnodar Prov., Russia [Strasser, 1970; Golovatch *et al*., 2016, 2018, 2021].

Brachydesmus kalischewskyi Lignau, 1915
Fig. 12.

MATERIAL. 1 juv. (ZMUM), Azerbaijan, Turianchay Nature Reserve, xeromorphic *Quercus* & *Pistacia* woodland, litter, 2–4.X.1994, S. Dashdamirov leg.; 11 ♂♂, 50 ♀♀ (DSTU), Russia, Krasnodar Prov., slope of Aishkha Mountain Ridge, Mzymta River valley, *Fagus* forest, 1250 m a.s.l., 43º37.055′N, 40º27.503′E, 16.IX.2021, Y.A. Chumachenko leg.; 1 ♂, 1 ♀ (ZMUM), Dagestan Republic, Agul Distr., Chirag, 41.817649ºN, 47.436119ºE, Chiragchay River bank, *Alnus* forest, 15.X.2021; 1 ♂, 5 ♀♀ (ZMUM), Chechen Republic, Shali Distr., Anishty, 43.104215ºN, 46.079969ºE, *Fagus* forest, 18.X.2021; 1 ♂, 1 ♀ (ZMUM), Chechen Republic, Kurchaloy Distr., near Niki-Khita, 43.104215ºN, 46.079969ºE, broadleaved forest, litter, hand-sorting, 18.X.2021; all D.I. Korobushkin & K.B. Gongalsky leg.

REMARKS. Subendemic of the Caucasus region, this highly polymorphous species is very common and highly widespread in the Russian Caucasus, Azerbaijan, Georgia, Armenia, eastern Turkey and northwestern Iran [Golovatch *et al*., 2016; Golovatch, 2021].

Polydesmus abchasius Attems, 1898

MATERIAL. 3 ♂♂ (SMNG), Georgia, Samegrelo-Zemo Svaneti, Martvili municipality, near Balda village, Balda Canyon, 42.4882ºN, 42.4079ºE, 13.VI.2019, H. Reip leg.; 1 ♀ (DSTU), Abkhazia, Tkvarchel Distr., near Akarmara, mixed forest, litter, 42.8605ºN, 41.7662ºE, 23.III.2021, leg. I.S. Turbanov; 1 ♂, 1 ♀ (DSTU), Russia, Adygea, Caucasian Nature Reserve, Lagonaki Plateau, mixed *Betula* & *Picea* forest, 44º03′39.2″N, 40º01′03.0″E, 5.V.2021, A.P. Evsyukov leg.

REMARKS. Endemic to the northern and northwestern Caucasus. Previously recorded from the Krasnodar Province, Adygea, Abkhazia and Georgia [Golovatch *et al*., 2016, 2021; Kokhia *et al*., 2020; Golovatch, 2021].

Polydesmus stuxbergi Attems, 1907
Fig. 13.

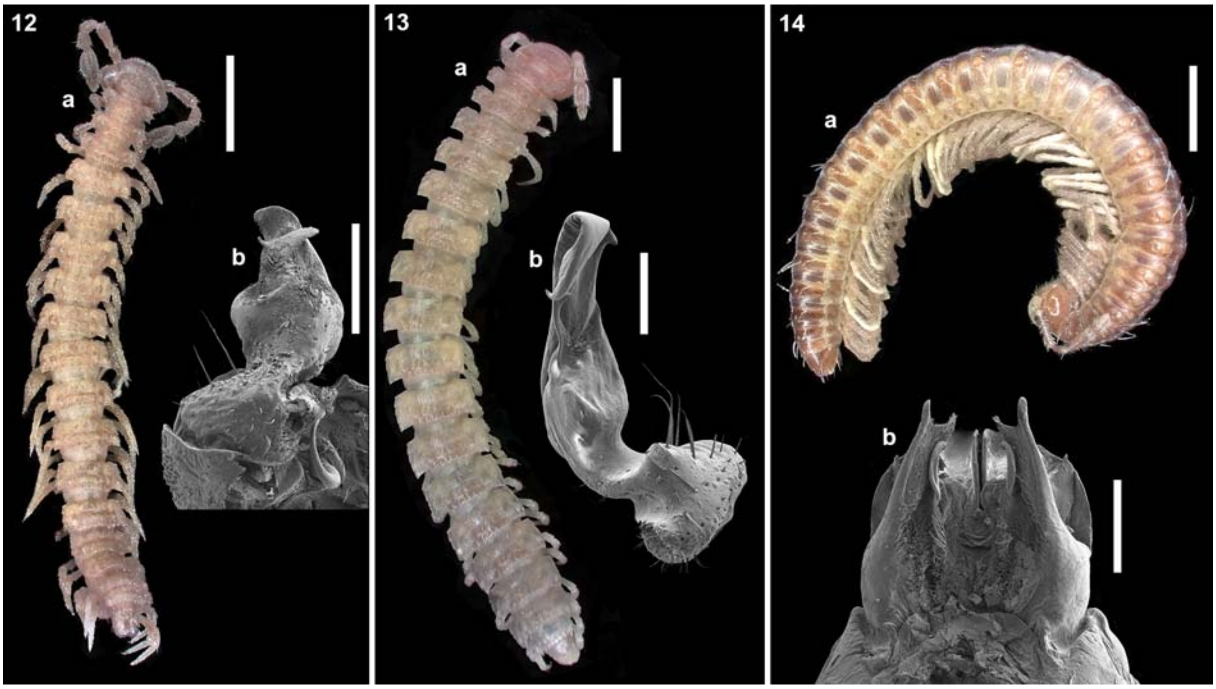
MATERIAL. 2 ♂♂, 7 ♀♀, 1 juv. (DSTU), Russia, Rostov-on-Don Region, near Stoyanov, valley of Tuzlov River, under stones, 47.4727ºN, 39.4706ºE, 5.XI.2021, A.P. Evsyukov leg.

REMARKS. This species has been recorded so far from Crimea, the Kharkov Region of Ukraine [Golovatch, 1990b], as well as the Rostov-on-Don Region and Stavropol Province of Russia [Evsyukov, Golovatch, 2013; Zuev, 2021]. Mostly occurring in anthropogenic habitats.

Family Paradoxosomatidae

Strongylosoma kordylamythrum Attems, 1898

MATERIAL. 1 ♂ (SMNG), Georgia, Samegrelo-Zemo Svaneti, Nikortsminda, at Sakinule Cave, deciduous forest, in litter,



Figs 12–14. Habitus (**a**) and gonopods (**b**) of some millipedes from the Caucasus region: 12 — *Brachydesmus kalischewskyi* Lignau, 1915; 13 — *Brachydesmus stuxbergi* Attems, 1907; 14 — *Caucaseuma variabile* Antić et Makarov, 2016. Scale bars: 1 mm (**a**); 0.1 mm (**b**).

Рис. 12–14. Габитус (**a**) и гоноподы (**b**) некоторых двупарноногих многоножек из Кавказского региона: 12 — *Brachydesmus kalischewskyi* Lignau, 1915; 13 — *Brachydesmus stuxbergi* Attems, 1907; 14 — *Caucaseuma variabile* Antić et Makarov, 2016. Масштаб: 1 мм (**a**); 0,1 мм (**b**).

42.4633ºN, 43.0667ºE, 14.VI.2019, H. Reip leg.; 1 ♂ (DSTU), Abkhazia, Ochamchira Distr., near Jal, mixed forest, litter, 42.8319ºN, 41.5402ºE, 22.III.2021; 1 ♀, 1 juv. (DSTU), Abkhazia, Tkvarchel Distr., near Tkvarchel, treeless slope, under stones, 42.8618ºN, 41.6802ºE, 24.III.2021, all I.S. Turbanov leg.; 1 ♂ (DSTU), Russia, Adygea, Caucasian Nature Reserve, Lagonaki Plateau, mixed forest (*Betula* & *Picea*), 44º03′39.2″N, 40º01′03.0″E, 5.V.2021, A.P. Evsyukov leg.

REMARKS. This pan-Caucasian species is very common and widespread throughout the Caucasus region, including Hyrcania within southeastern Azerbaijan and northwestern Iran [Zuev, 2014, 2021; Evsyukov *et al*., 2016; Golovatch *et al*., 2021]. Also occurring in Ciscaucasia within the Rostov-on-Don Region and the Republic of Kalmykia [Evsyukov, Golovatch 2013]. In the Stavropol Province, *S. kordylamythrum* has been found in bird nests [Golovatch, Matyukhin, 2011].

ORDER CHORDEUMATIDA

Family Anthroleucosomatidae

Caucaseuma variabile Antić et Makarov, 2016

Fig. 14.

MATERIAL. 2 ♂♂, 2 ♀♀ (DSTU), Russia, Krasnodar Prov., Caucasian Nature Reserve, valley of Khodzhibi River, *Abies* & *Betula* forest, 2050 m a.s.l., 43º49.388′N, 40º31.138′E, 30.IX.2021, Y.A. Chumachenko leg.

REMARKS. Endemic of the Caucasus Major. Described from North Ossetia – Alania, as well as the Krasnodar and Stavropol provinces of Russia, and the Mtskheta-Mtianeti region of Georgia [Antić, Makarov, 2016, 2022; Golovatch, Antipova, 2022].

Acknowledgements. We are most grateful to Roman Zuev (Stavropol, Russia), Konstantin Gongalsky, Daniil Korobushkin, Olga Makarova (all Moscow, Russia), Aleksandr Koval (Saint Petersburg, Russia), Polina Somchenko (Krasnodar, Russia), Selvin Dashdamirov (Düsseldorf, Germany), Hans Reip (Jena, Germany) and Karin Voigtländer (Görlitz, Germany) who provided additional material for the present study. APE, YAC, IYZ and BV were supported by RFBR (project No. 20-54-18008) and BNSF (project number KP-06-Russia/6-11.12.2020) grants. IST is supported within the framework of the State Assignment No. 121051100109-1. The determination of the collections of Reip, Walther and Voigtländer by BV was funded by the "Erika und Walter Datz Stiftung, Bad Homburg v.d. H." foundation under the project "Integration of the Diplopoda collection Reip into the collection of the SMNG (2020)".

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Responsible editor K.G. Mikhailov